



Plants

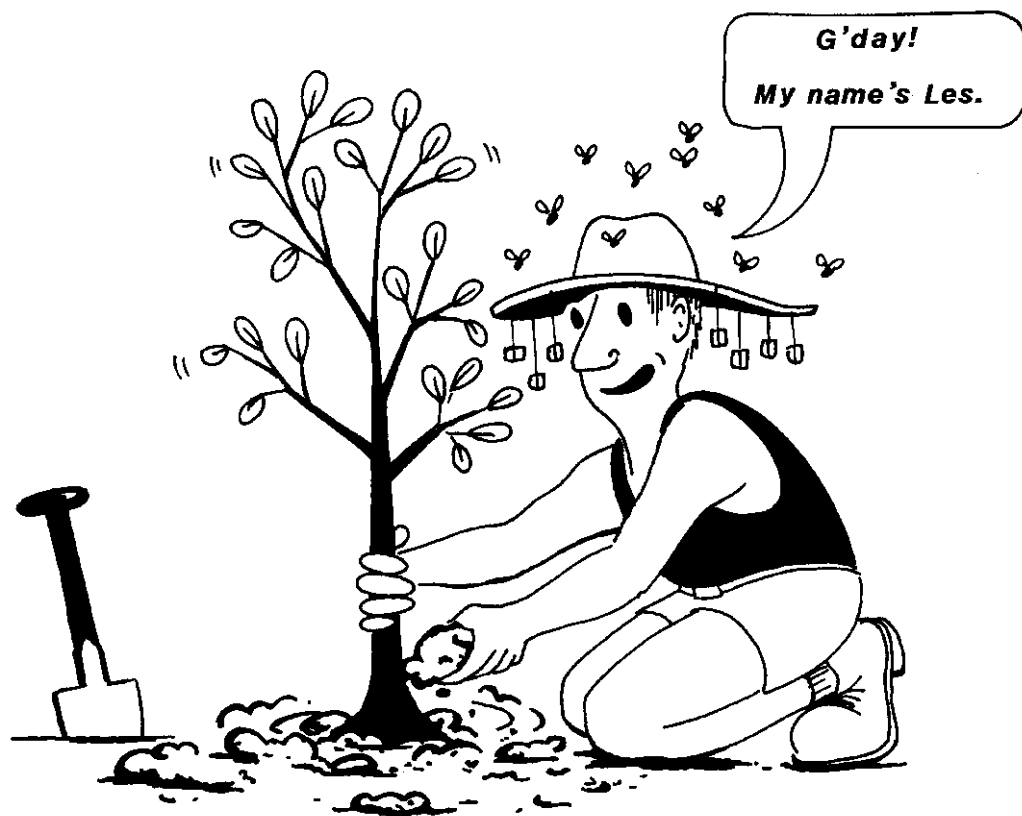
A Workbook For Schools



Written by Stuart Traynor Illustrated by Kaye Kessing



Northern Territory Government



Introduction . . .

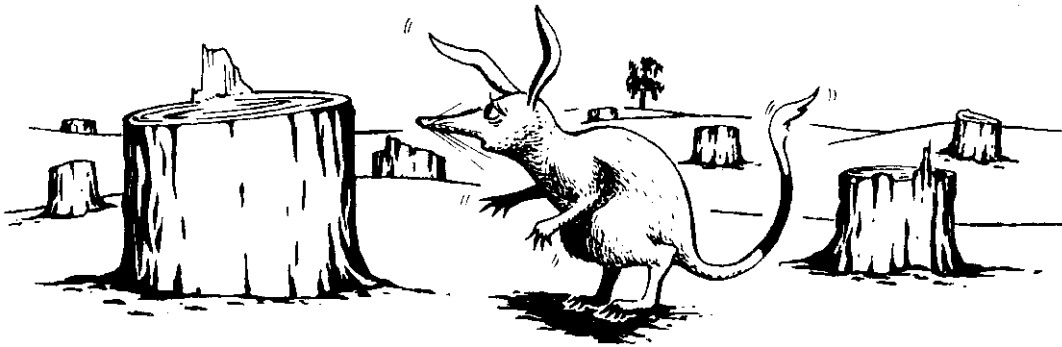
THE EARTH NEEDS PLANTS

Plants are very important living things.

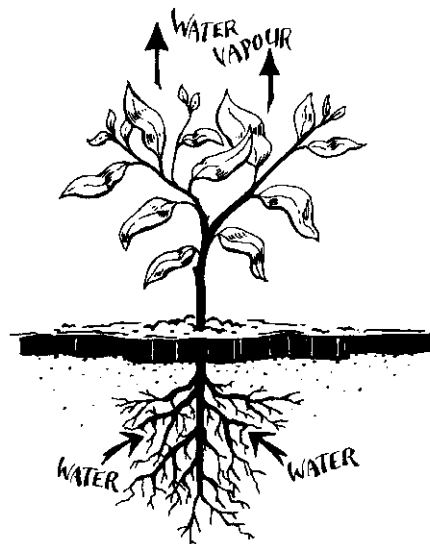


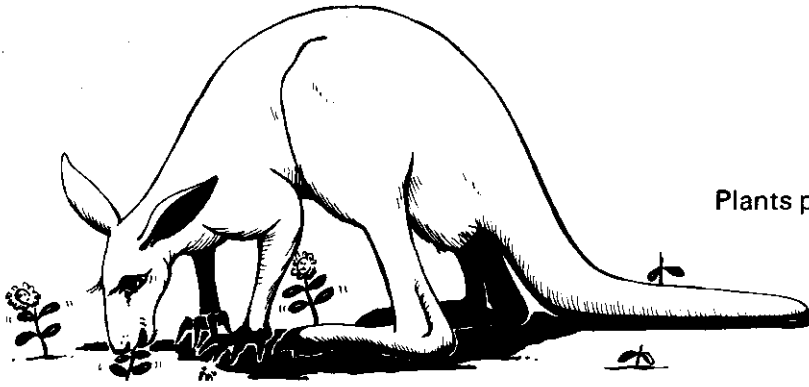
They provide shade and shelter for people and other animals. Trees planted along streets and around houses make our towns better places to live in.

They give us building materials, clothing, paper and medicines.



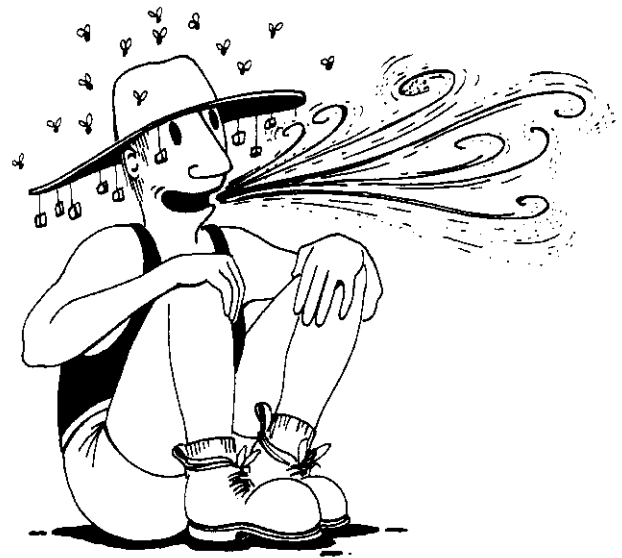
Plants are also important because they help to make rain. They pump water out of the soil and return it to the atmosphere.



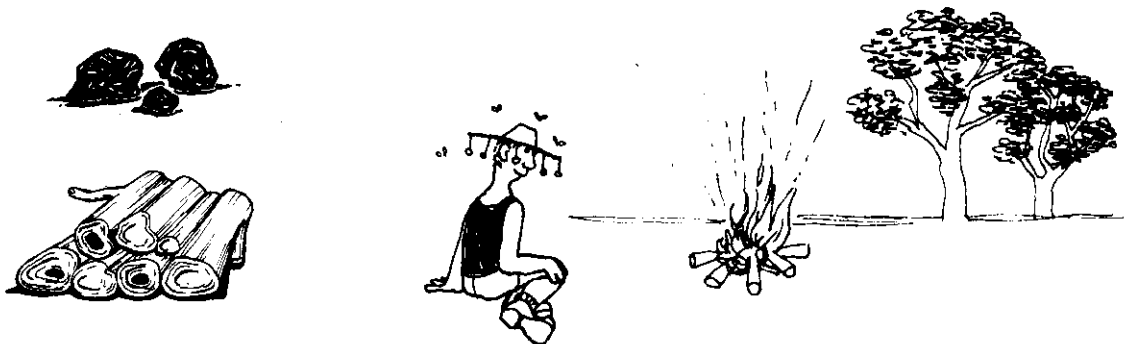


Plants provide food for animals to eat.

During the daytime they make oxygen gas which animals need.



Plants give us energy to cook our food, warm our homes and run our machines.



The wood of trees contains lots of stored energy.

Despite their importance, people cut down many trees and forests each year. Three quarters of the forests that covered Australia when Captain Cook arrived in 1770 have now been cleared.



We must preserve as many trees as possible and plant new ones to replace the ones that are gone. The earth needs plants. This book has been written to help you learn more about them.



*Our survival
depends on their
survival.*

Check Point . . .

Why are plants important to people? (Write down as many things as you can.)

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.....

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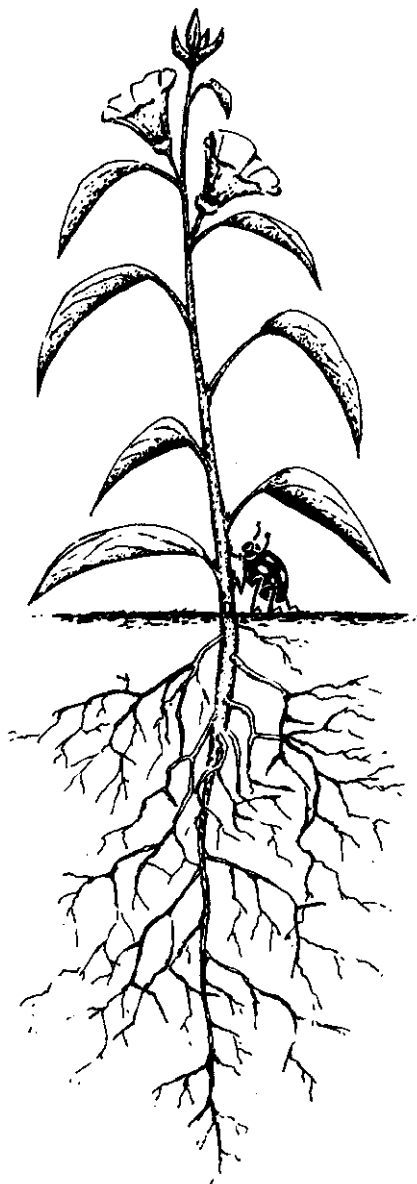
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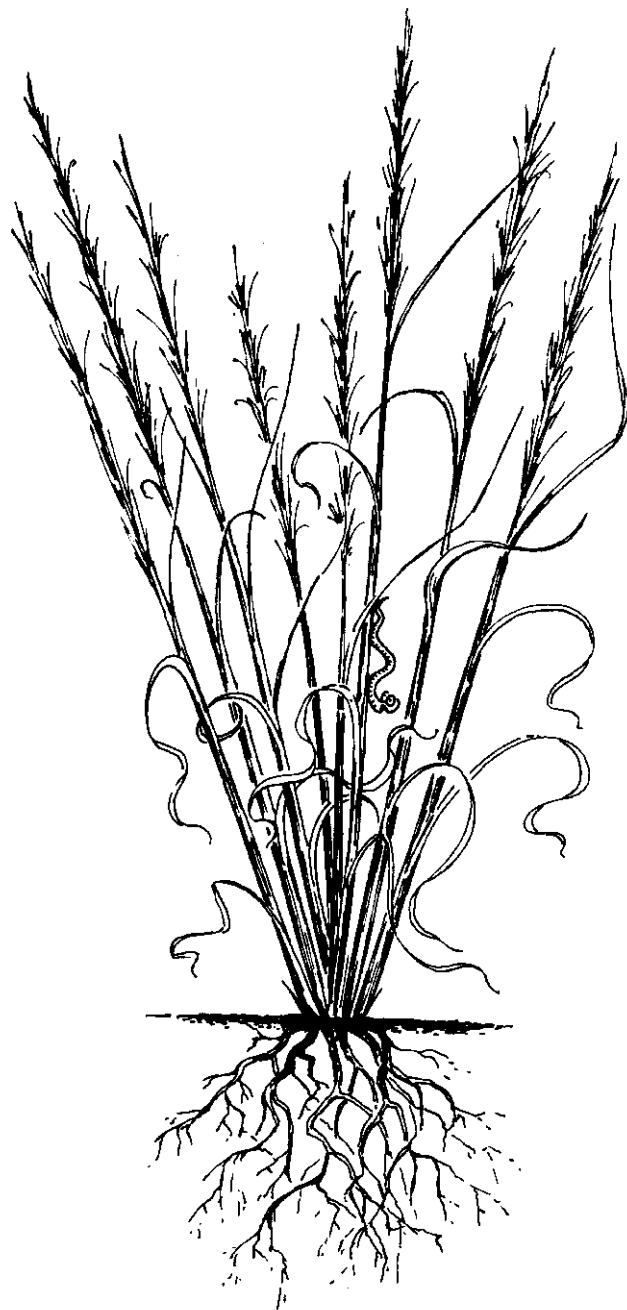
ACTIVITY 1 Why do plants have roots?

A lot of a plant's body is below the ground.
This is the root system.



Tap root system

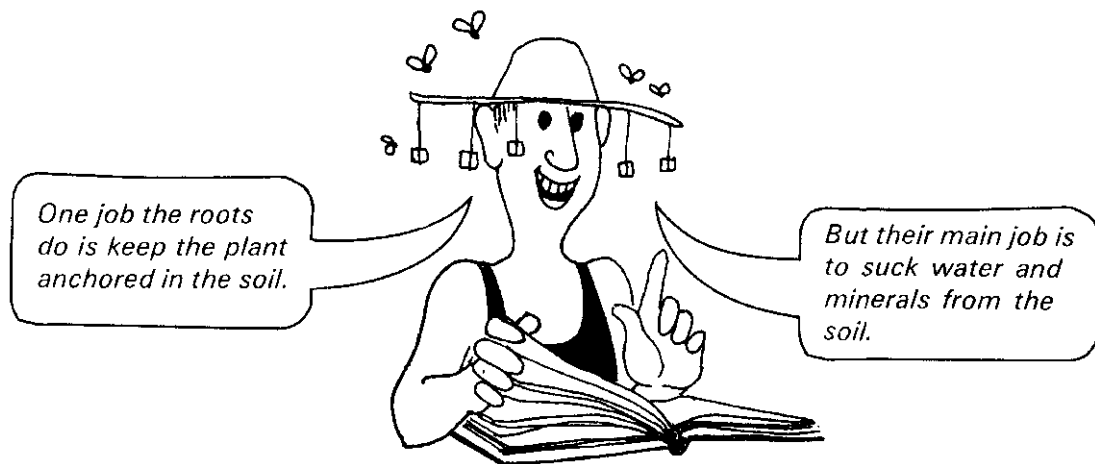
Some plants have a main root with smaller roots coming off it.



Fibrous root system

Other plants have no main root.

The roots of plants do several jobs.

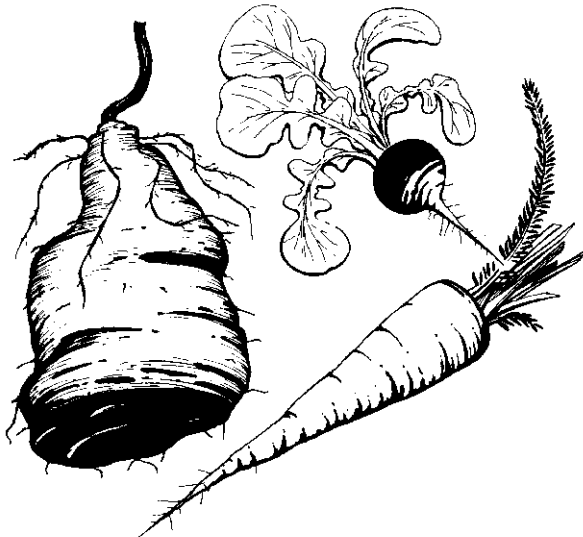


As well as sucking up water and anchoring the plant, the roots help the earth.



They hold the soil together and stop erosion by the wind and the rain.

The roots of some plants also do an extra job. They store food for the plant.



Carrots, yams and radishes are fat roots.

Lots of yams grow in the Top End during the wet season. Their stems and leaves climb around the trunks of trees in the tropical woodland. Their roots grow fat and are ready for eating in the dry season.



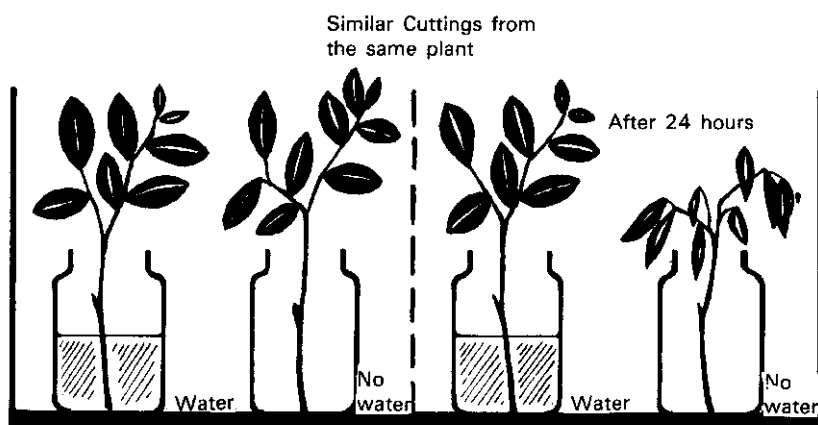
Check Point . . .

Write down 4 jobs that roots do.

1.
2.
3.
4.

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ACTIVITY 2 Why do plants wilt?



Plants wilt quickly without water. This is because they sweat like people do.

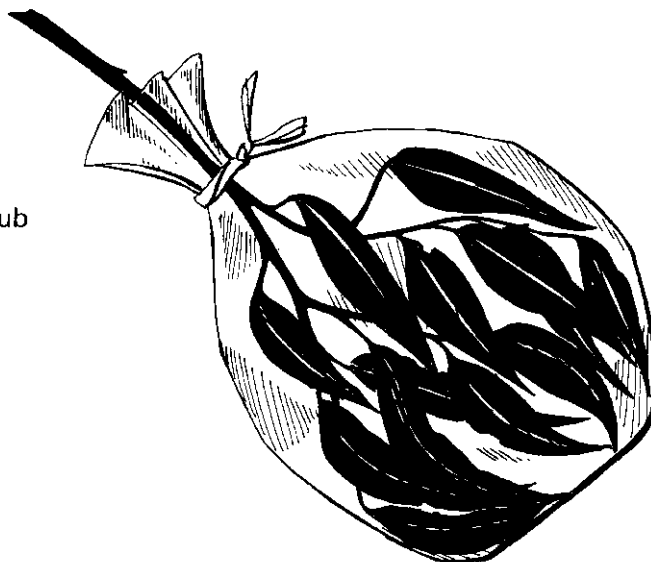
Set up the following experiment.

Materials needed

- a shrub or small tree
- plastic bag
- twistie tie



STEP 1 Put a plastic bag over some leaves on a shrub or small tree. Tie it up with a twistie tie.

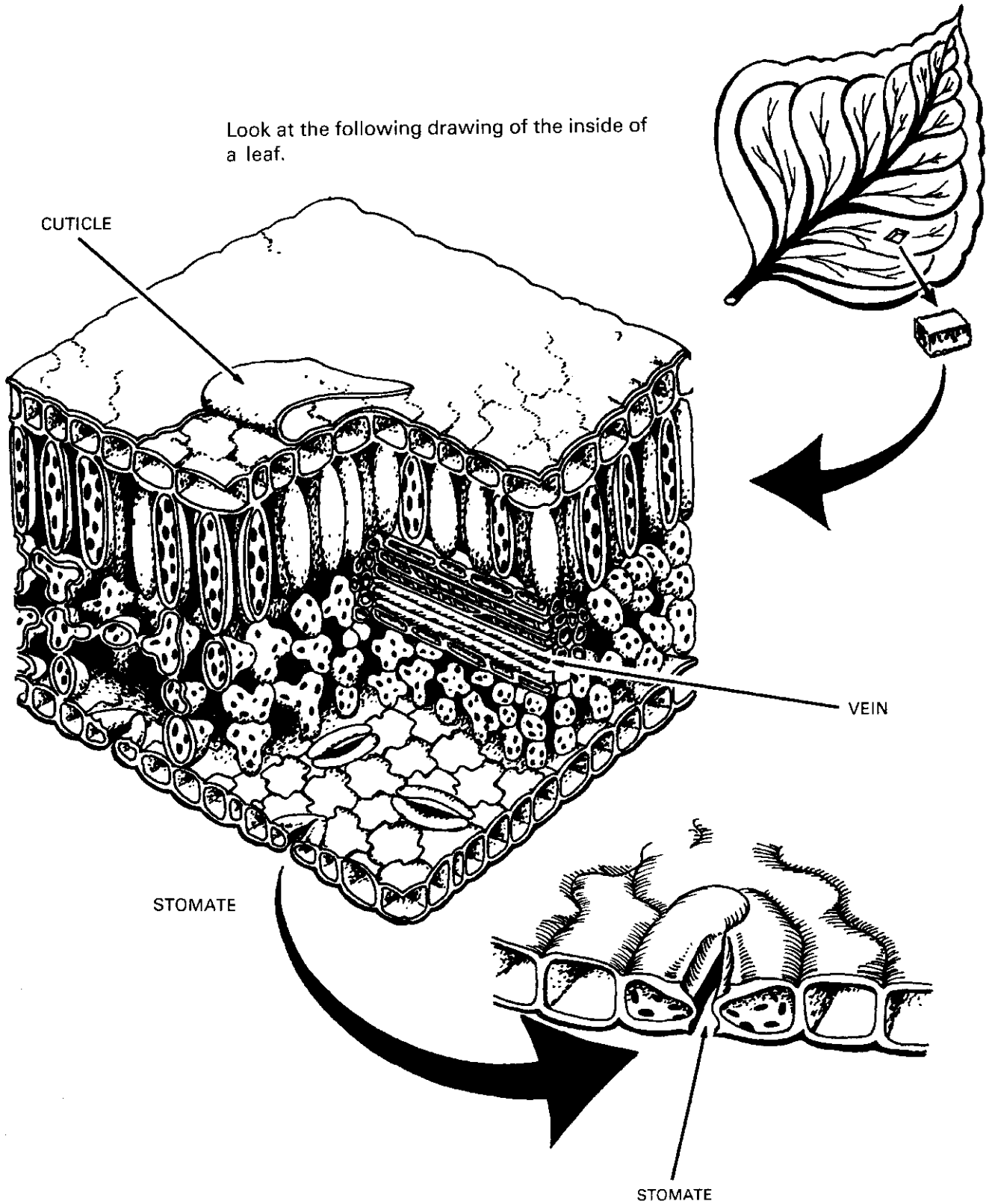


STEP 2

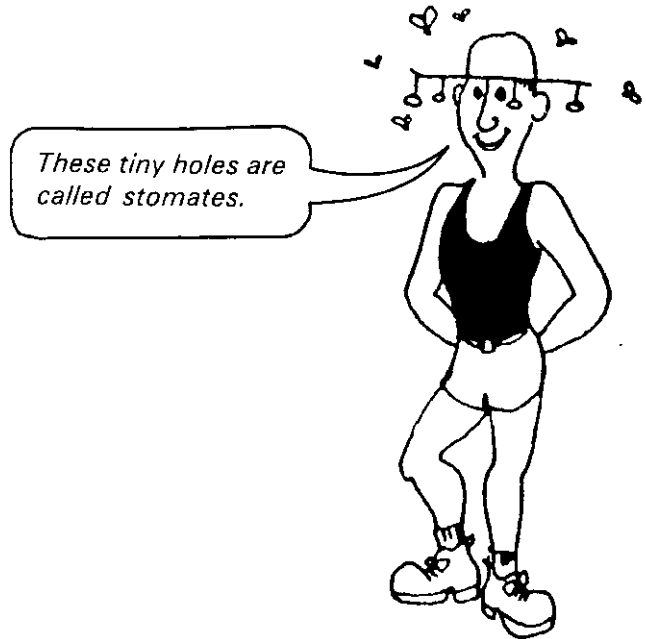
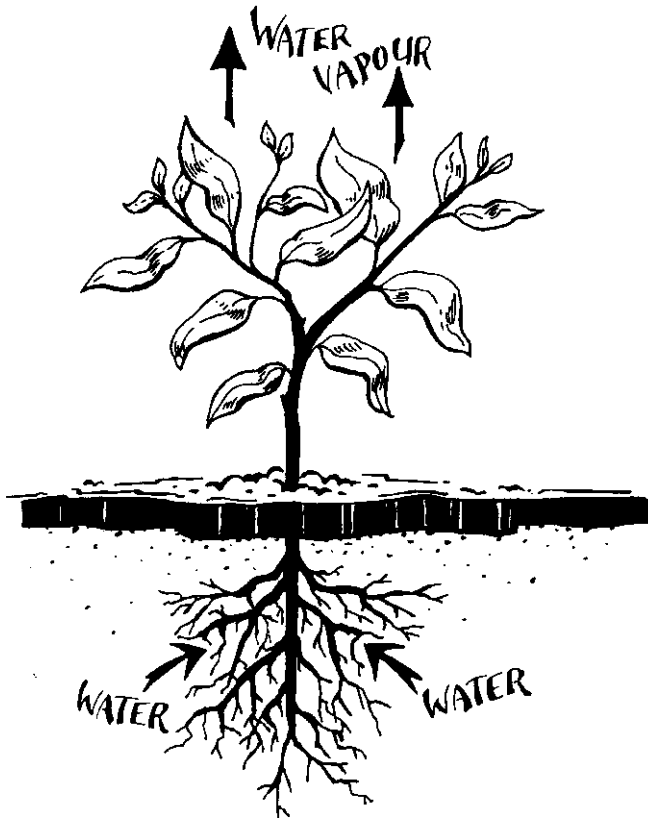
Leave the bag there for a day.

Describe what happens

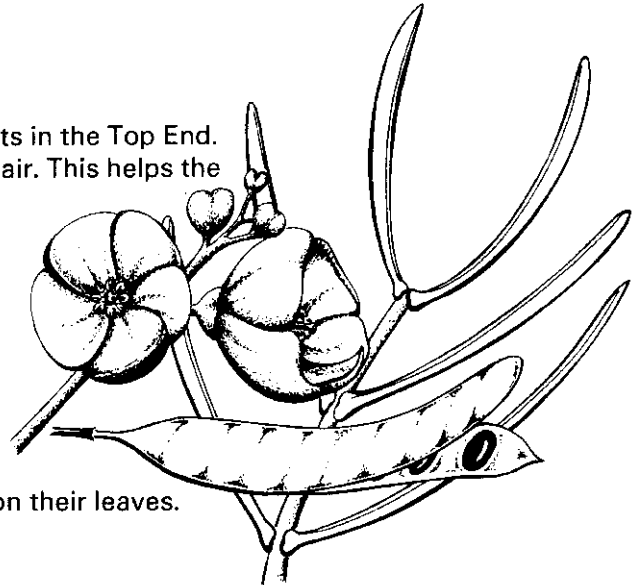
Look at the following drawing of the inside of a leaf.



Plants sweat just as people do. The water evaporates through tiny holes on the bottom sides of the leaves.



Desert plants usually have narrower leaves than plants in the Top End. This means there are fewer stomates exposed to the air. This helps the desert plants to sweat less and save water.



Sometimes they also have hairs or a coating of wax on their leaves. These things also help them to save water.

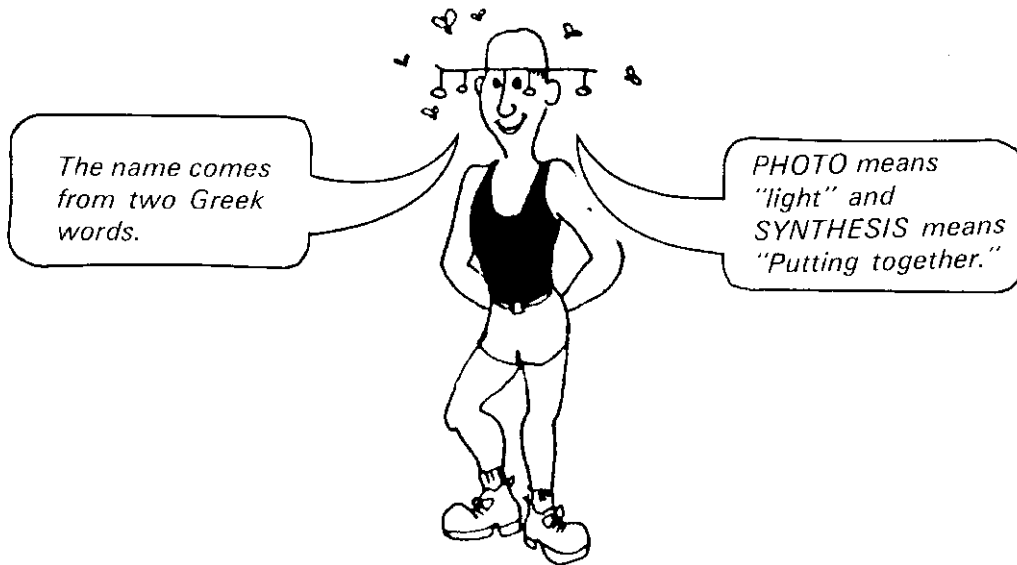
Check Point . . .

1. Plants sweat through tiny holes on the leaves called
2. Are these on the top side of the leaf or on the bottom side?

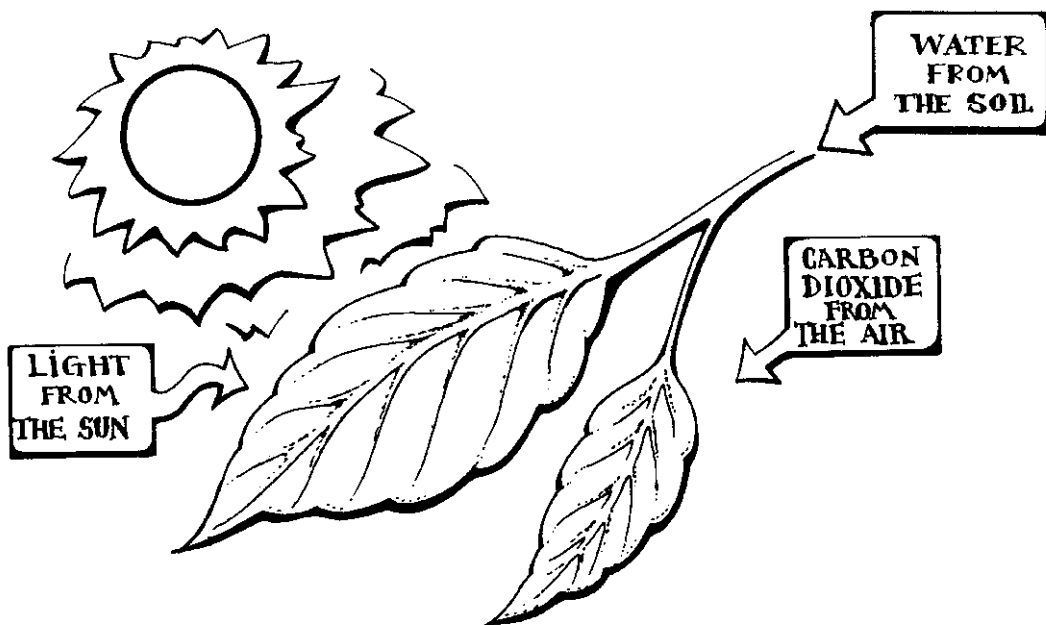
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ACTIVITY 3 How does a plant feed itself?

A plant makes its own food. This amazing process is called photosynthesis.



Photosynthesis happens in the leaves during the daytime. The leaves are the plant's food making factories. They need three raw materials: carbon dioxide, water and light.



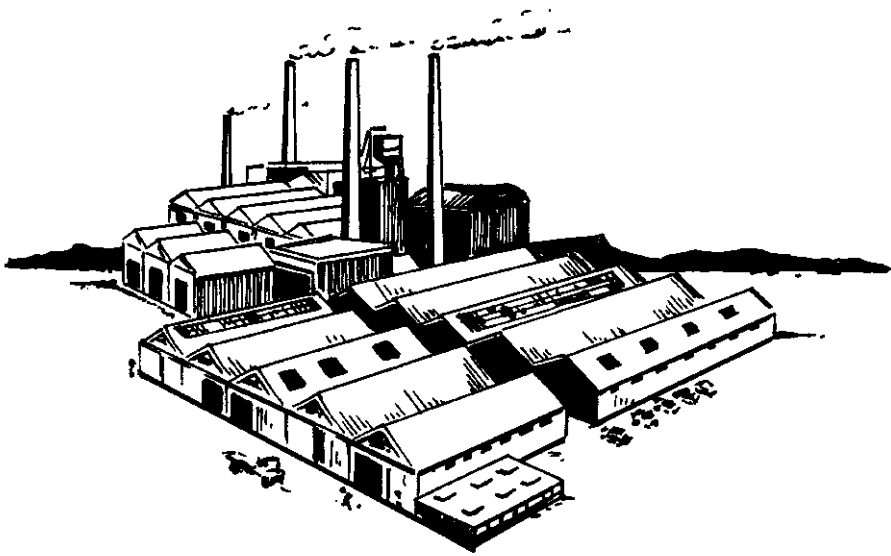
How do you think the carbon dioxide gas gets inside the leaf?

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.....

.....

Like other factories, the leaves produce a waste product, when they make food. This waste product is a gas called oxygen.



Oxygen is a very handy product because all animals need it. If plants did not produce oxygen during the daytime, the atmosphere would soon run out of this important gas. What would then happen to people and other animals on earth?

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You can observe a plant giving off oxygen gas if you do the following experiment.

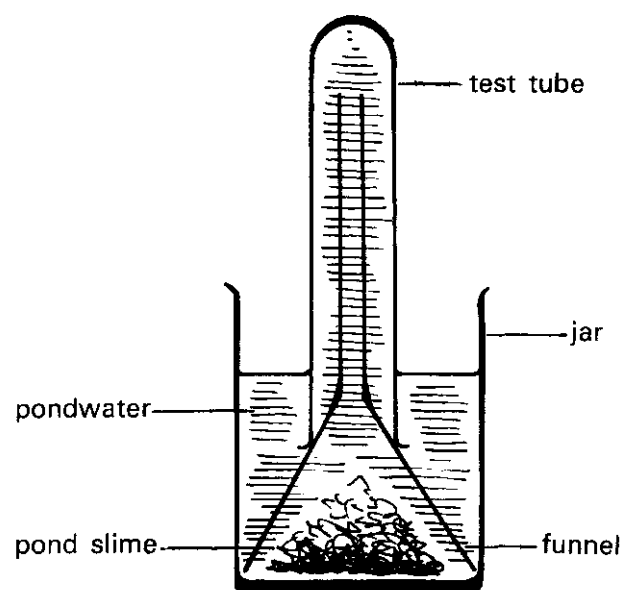
Materials needed

- fresh green pond slime from a creek or waterhole
- a bucket of pondwater
- glass funnel
- test tube
- large jar or beaker

WHAT TO DO

STEP 1 Set up the experiment shown in the drawing. (You will need to fill the test tube under the water to stop air getting trapped inside.)

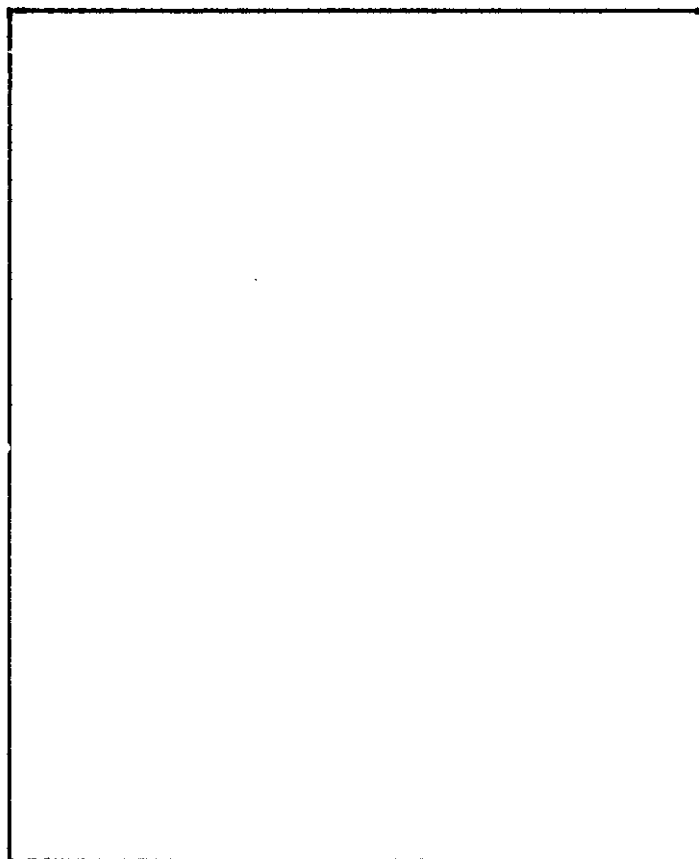
STEP 2 Leave the experiment in a sunny place for a few hours. Observe what happens later.



STEP 3

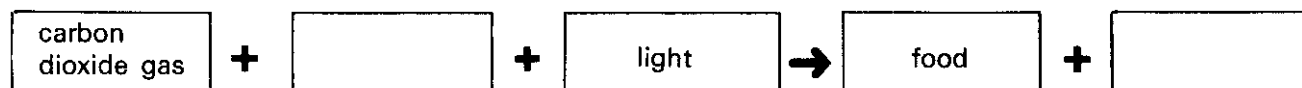
Did you see a gas bubbling off the pond slime and collecting in the test tube?

This is oxygen.



Check Point . . .

1. Complete this word equation for photosynthesis.



2. In what part of the plant does photosynthesis happen?

3. Where does the plant get these raw materials from?

(a) carbon dioxide gas

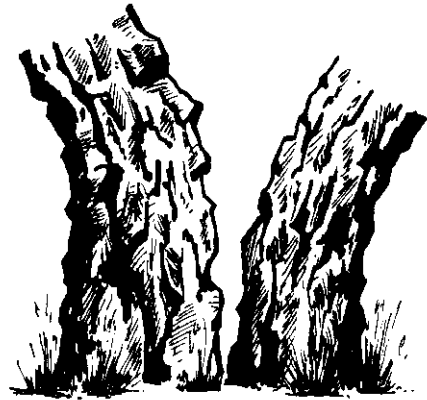
(b) water.

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ACTIVITY 4 Why does a tree have bark?

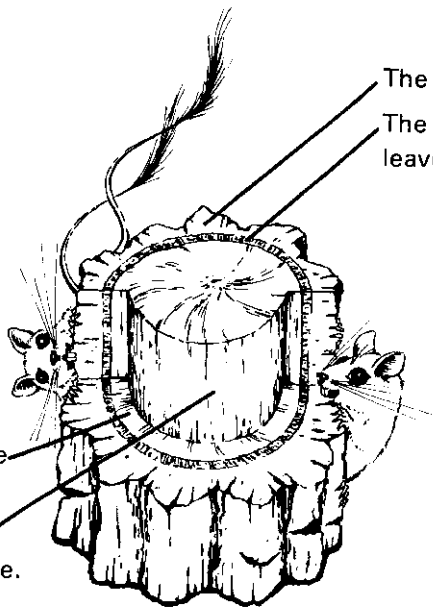
A tree's bark is like our skin. The outside of the bark is tough and protects the trunk from damage.



Corkwood trees grow in Central Australia. They have very thick bark. This acts like a fireproof coat to protect the tree during bushfires.

The milkwood trees of the Top End also have thick bark to protect them from fires.

The bark of a tree does another job. It contains tiny tubes to carry food from the leaves to the roots.



The outer bark protects the trunk.

The inner bark conducts food from the leaves to the roots.

The sapwood conducts water from the roots to the leaves.

The heartwood is dead wood which stiffens the trunk and supports the tree.

Check Point . . .

1. What job does the outside bark of a tree do?

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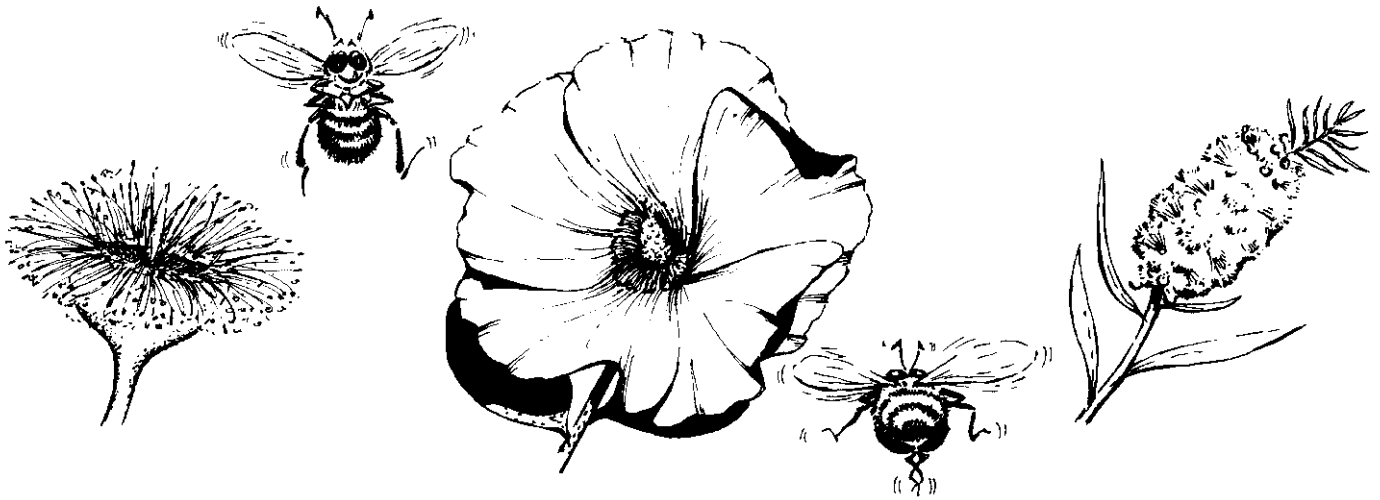
2. Why does ringbarking kill the roots of a tree?

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ACTIVITY 5 Why does a plant have flowers?

Flowers come in all shapes and sizes. They may occur individually or in groups called an inflorescence. But they all do the same job. They make seeds.



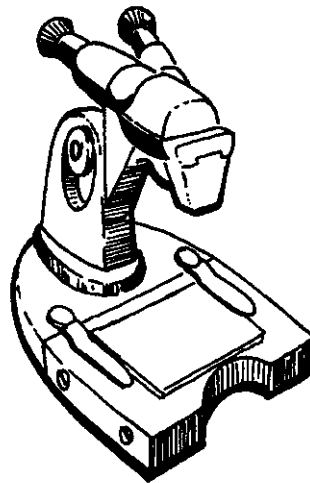
River Red Gum

Sturt's Desert Rose

Bottlebrush inflorescence consisting of many flowers attached along a stalk.

Materials needed

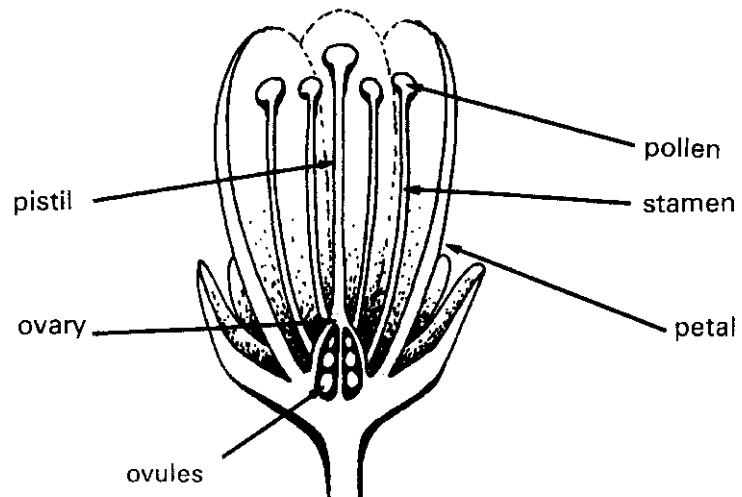
- large flower
- razor blade
- magnifying glass or binocular microscope



WHAT TO DO

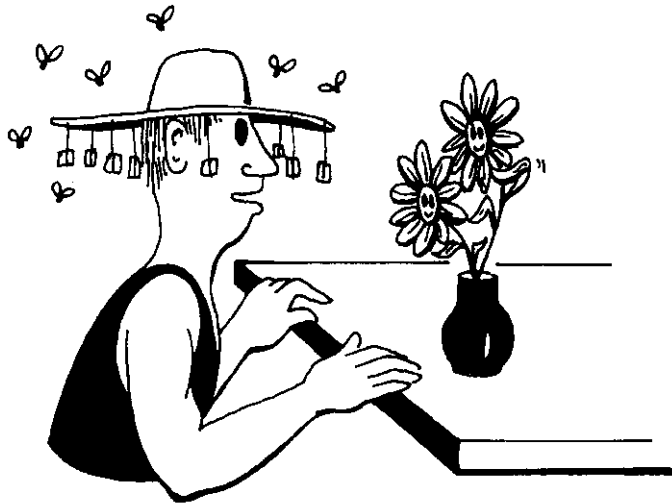
STEP 1

Find a large flower. Identify the petals, stamens, pollen, pistil and ovary.



STEP 2

Carefully slice open the ovary with a razor blade. Study the ovules with a magnifying glass or binocular microscope.



Stamens The stamens make pollen. Each stamen has a stalk with a pollen sac at the end.

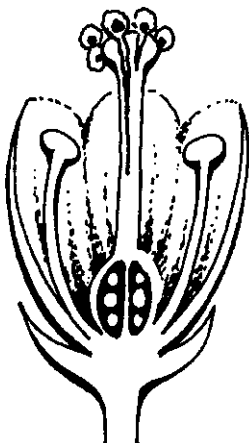
Pistil The pistil is a long stalk in the centre of the flower. The pistil is thicker than the stamens.

Petals Petals are usually brightly coloured to attract insects and birds.



When insects and birds come to eat the flower's sweet nectar, they brush pollen onto the top of the pistil. This is called pollination.

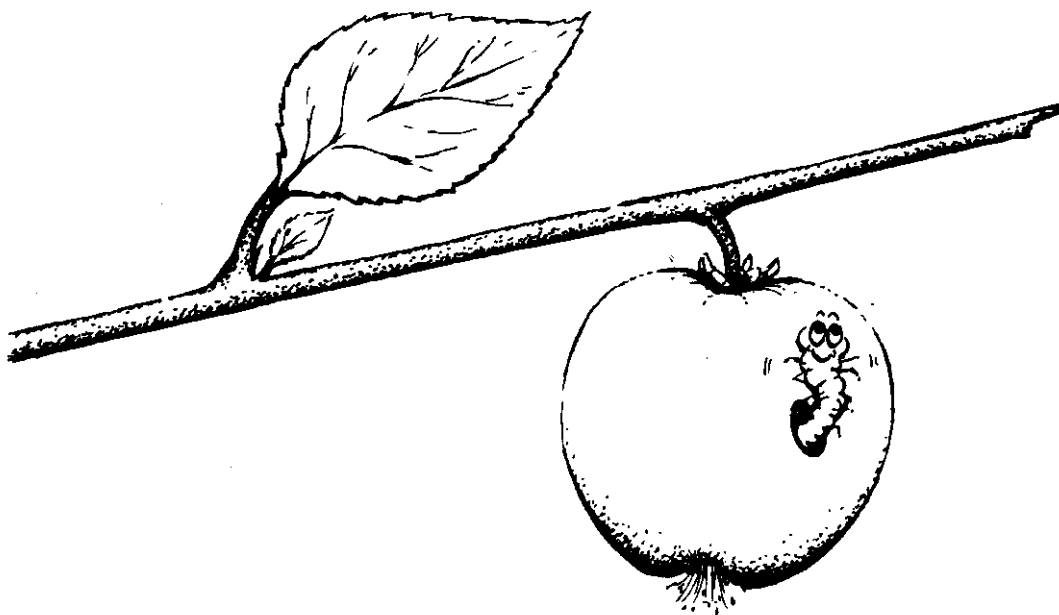
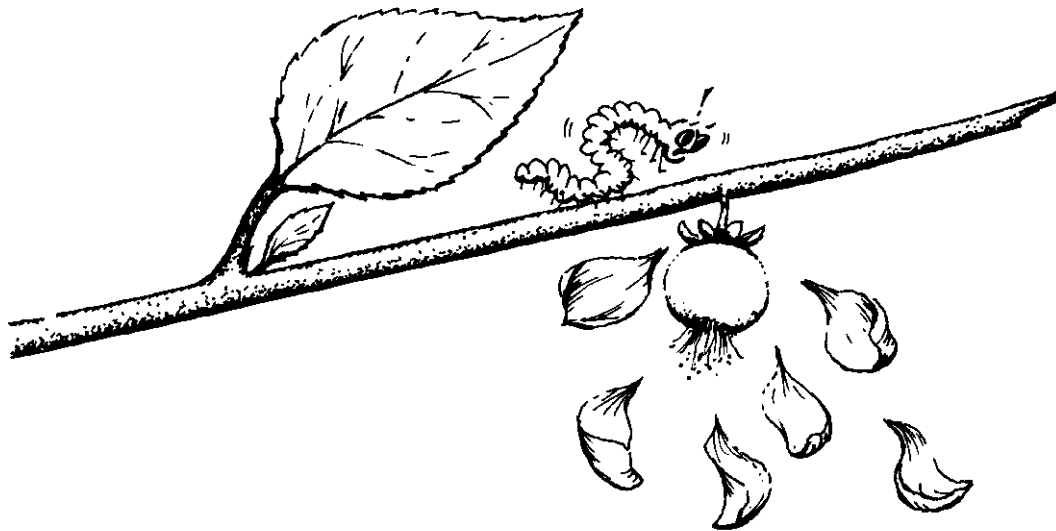
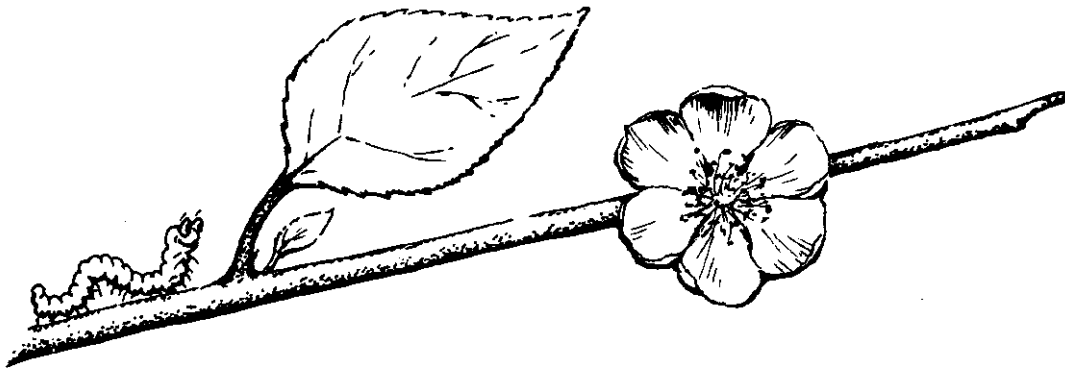
Sometimes the wind blows the pollen onto the pistil.



Fertilization

After pollination, the pollen grains grow down through the pistil to the ovules below. There they fertilize the ovules. Each ovule will become a seed.

Fruit Development: The ovary changes after the ovules are fertilized. The ovary swells up.

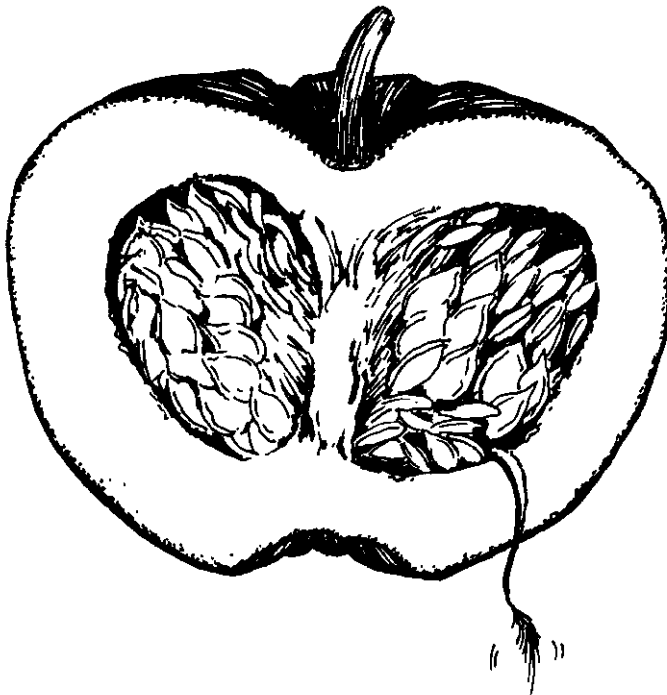
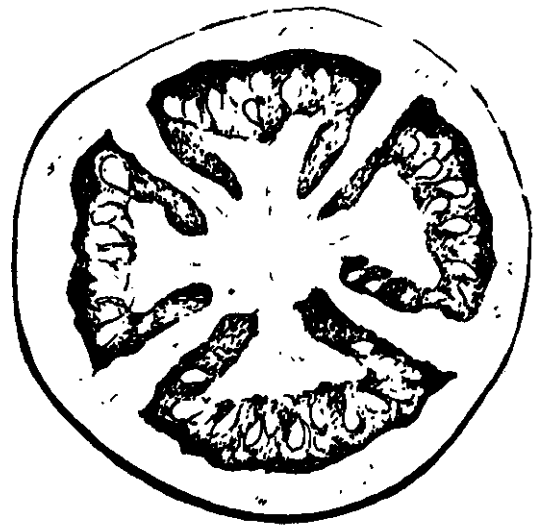
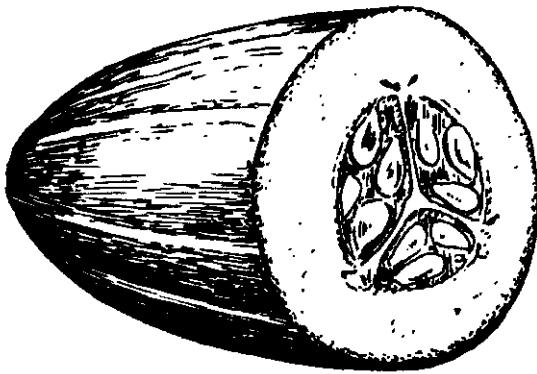


In apple trees the ovary fills with sugar and changes into a fruit. Each ovule becomes a seed. The petals and stamens shrink and fall off.

Tomatoes, pumpkins and cucumbers are also fruits. They grow from the ovary.



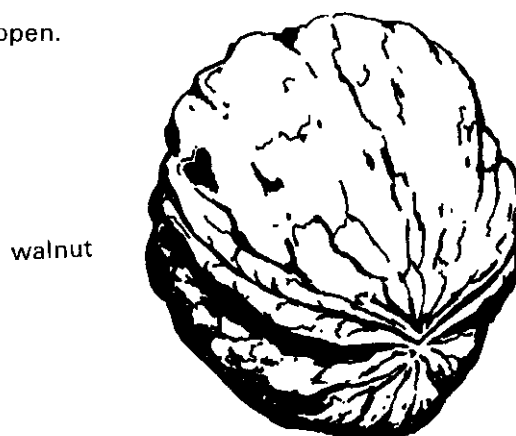
Radishes, carrots and yams are not fruits. They are fat roots, not fat ovaries.



Not all fruits are juicy and edible. In fact, most Australian trees have dry, woody fruits. Below are some different kinds of fruits.

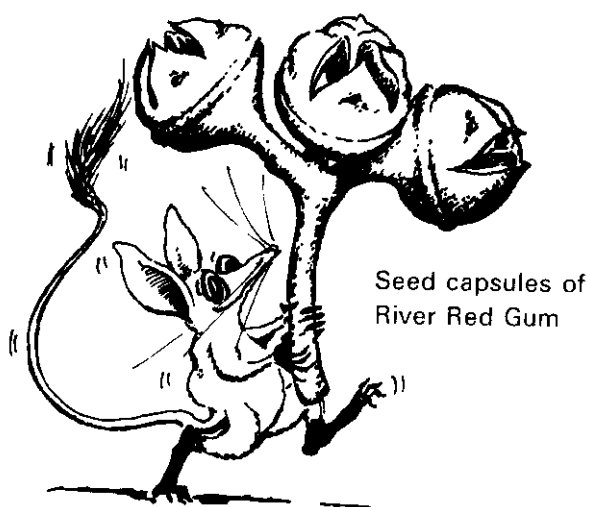
1. **nuts**

Nuts are dry fruits that do not split open.



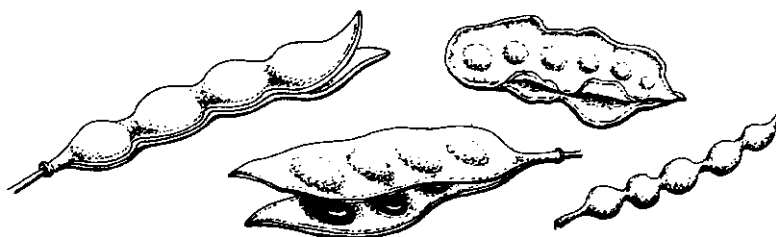
2. **capsules**

A capsule splits open and releases its seeds through several openings.



3. **Pods**

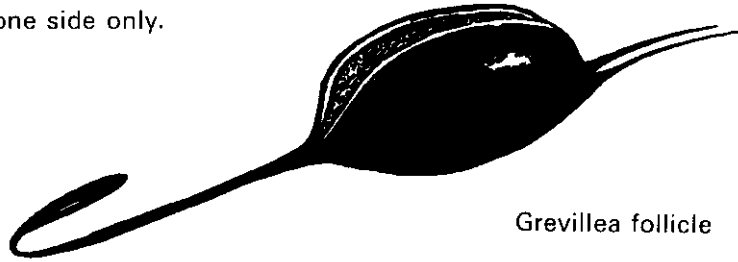
Pods are woody or papery fruits which split on two sides.



Some Acacia seed pods

4. **follicles**

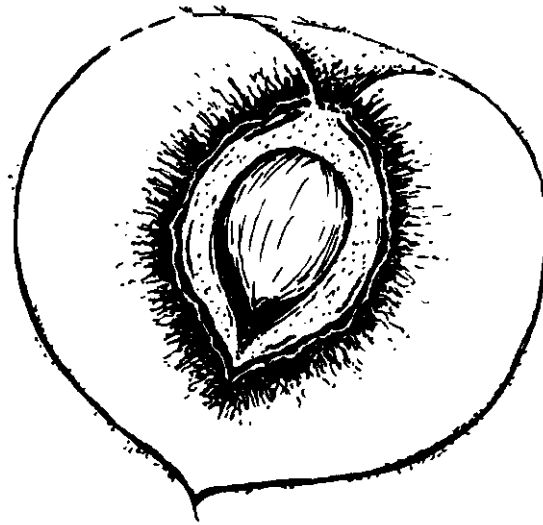
Follicles split down one side only.



Grevillea follicle

5. **drupes**

Drupes are fleshy fruits consisting of three layers: an outer skin, a layer of flesh and a hard stone which contains a single seed.



peach

Check Point . . .

Choose the correct answer in the three questions below.

1. The pollen is made in the
 - (a) ovary.
 - (b) pistil.
 - (c) stamens.
 - (d) petals.

2. After the pollen fertilizes the ovules
 - (a) each ovule becomes a fruit.
 - (b) the stamens and petals grow bigger.
 - (c) the ovary shrinks and falls off.
 - (d) the ovary changes into a fruit.

3. Which statement is true?
 - (a) All fruits are sweet and juicy.
 - (b) Pods are fruits which open down one side only.
 - (c) A peach fruit is called a drupe.
 - (d) Australian trees always have dry fruits.

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ACTIVITY 6 How are seeds scattered?

Plants have many ways of scattering their seeds.



Grass seeds are very small. The wind blows them around like dust.

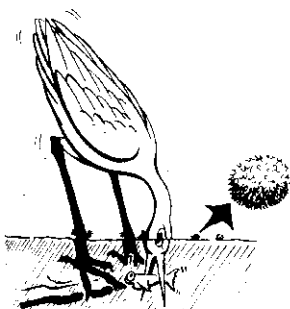


Some seeds have feathery parachutes to carry them in the wind.



Whitewood trees grow in Central Australia. Their seeds have wings to carry them through the air.

Mangrove trees grow along the Top End coast. Their seeds can float.

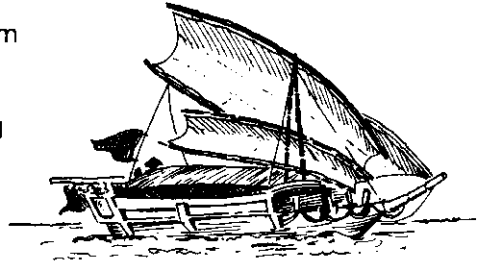


Animals carry many seeds. The seeds of some water plants stick to the feet of birds which walk through the mud. Other seeds have hooks or prickles. They stick to animals and hitch a ride.

People carry many seeds from one place to another.
Tamarind trees grow along the Top End coast. They have grown from seeds brought from Indonesia by Macassan sailors.

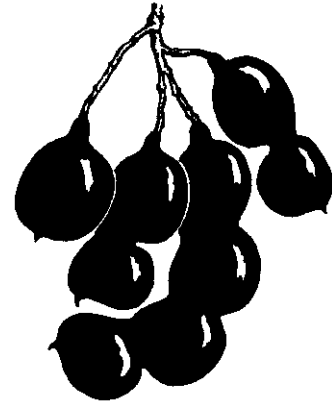
The Macassans visited the Top End for 250 years to collect trepang (sea slugs). They stopped coming in 1907.

The Macassans sold the trepang to the Chinese.

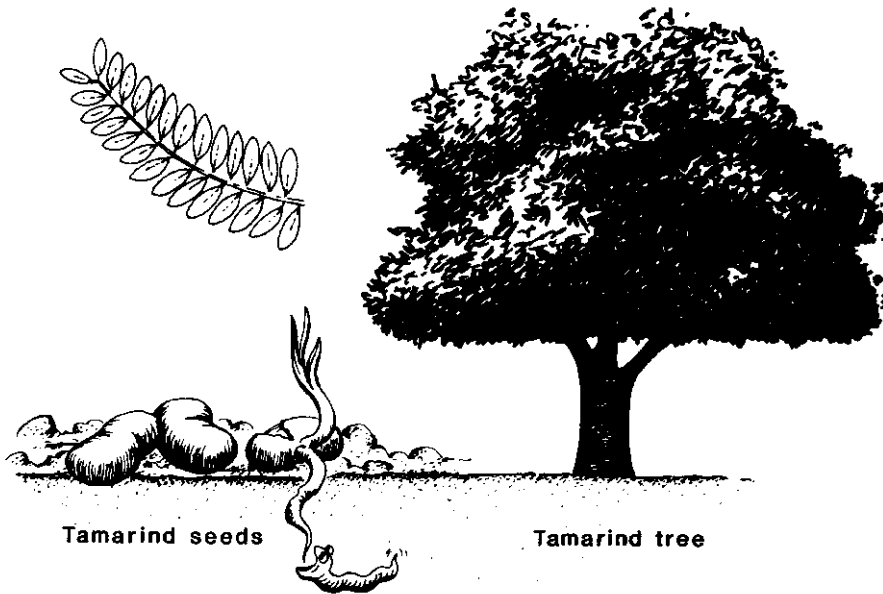


Macassan boat

The Macassans brought tamarind fruit with them to flavour their food and give them vitamins. Many of the seeds have germinated and grown into big trees.



Tamarind fruit



Tamarind seeds

Tamarind tree

Check Point . . .

1. How are the following seeds scattered?

(a) grass

(b) prickles

2. Who brought tamarind fruit from Indonesia to Australia?

..... Why?

3. Why did these people visit Australia?

.....

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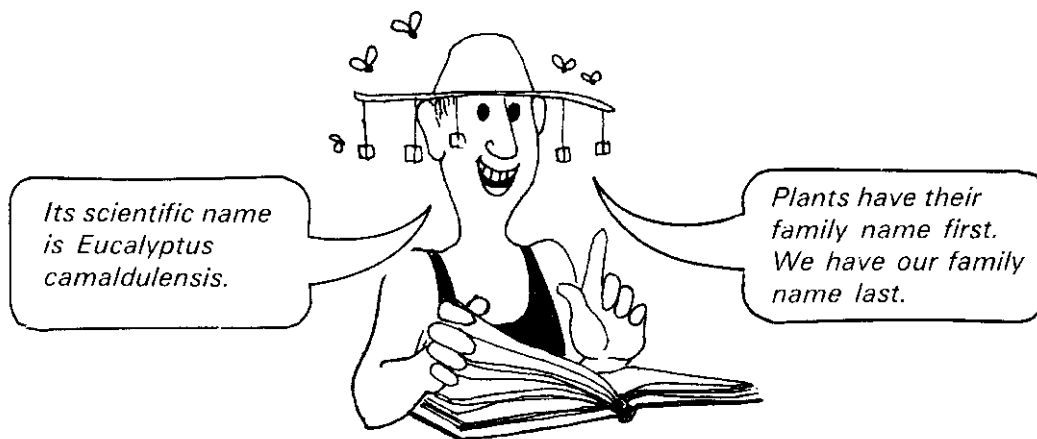
ACTIVITY 7 Two Australian Families

1 The Eucalyptus Family



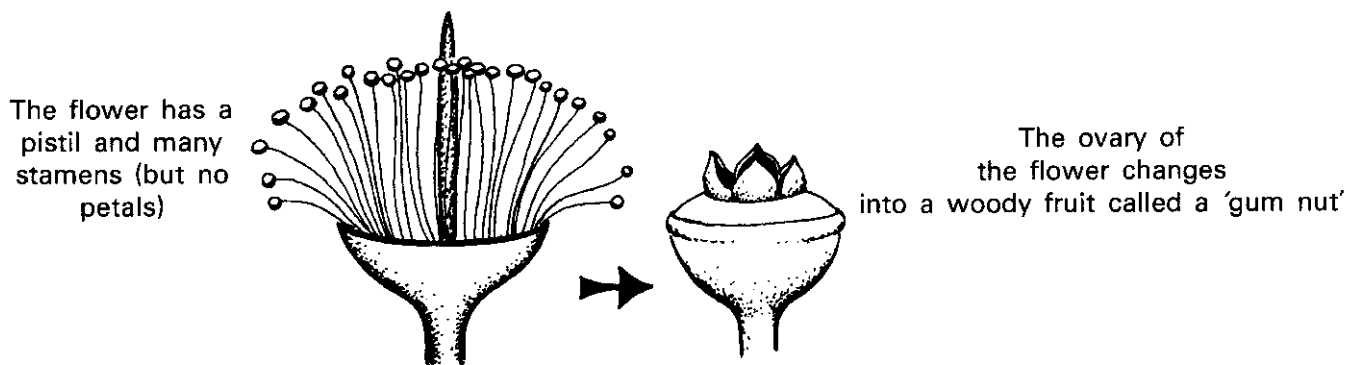
The members of the eucalyptus (u-kal-ip-tus) family are Australia's best known trees.

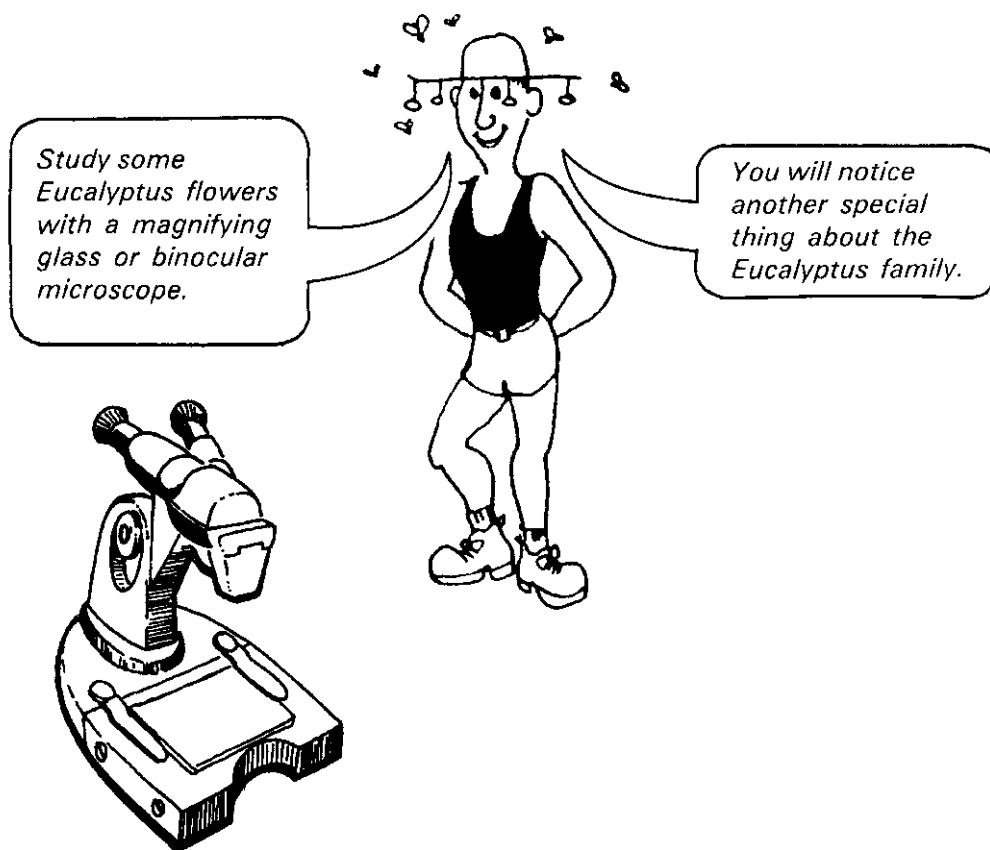
One of the most common of these trees is the River Red Gum. It grows along the banks of rivers and creeks in all states except Tasmania.



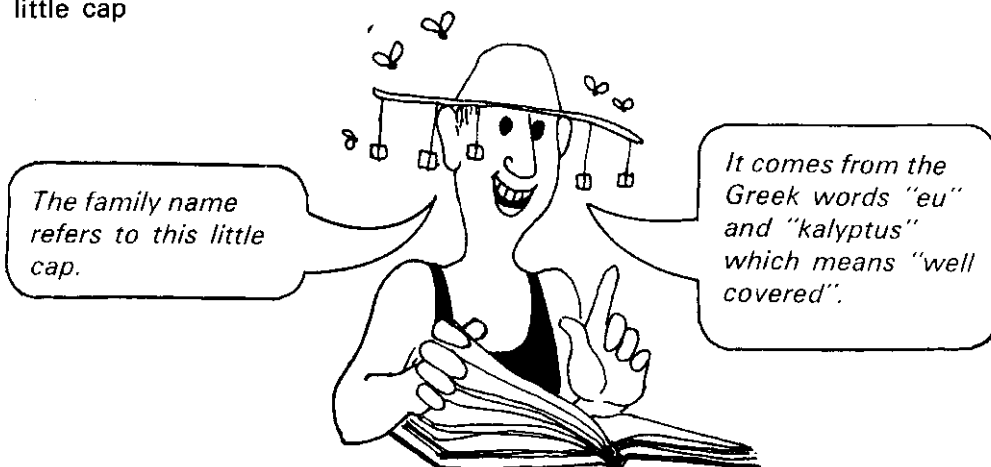
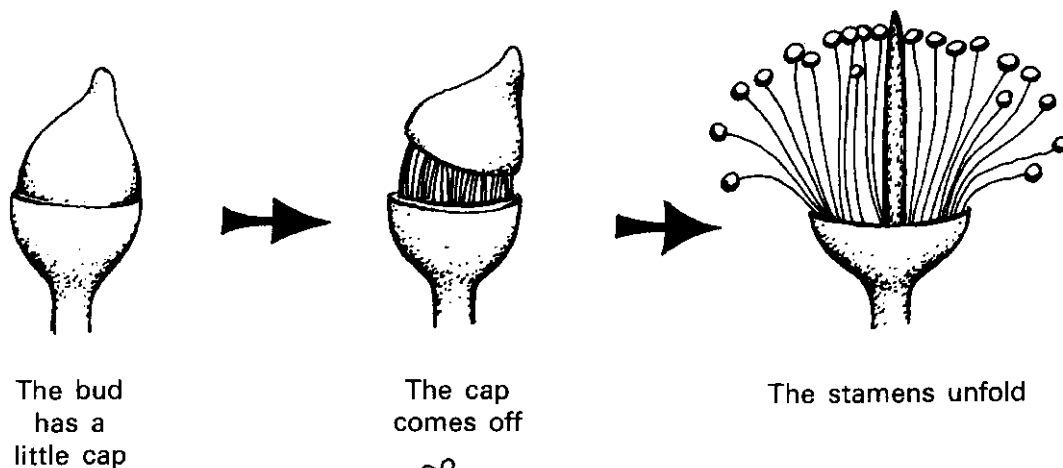
The flowers of gum trees are different from the flowers of apple trees.

1. They have lots of stamens but no petals.
2. They have a woody fruit instead of a sweet, juicy fruit.





Eucalytus flowers always have a little cap which covers the flower before it opens.



Some things to do.

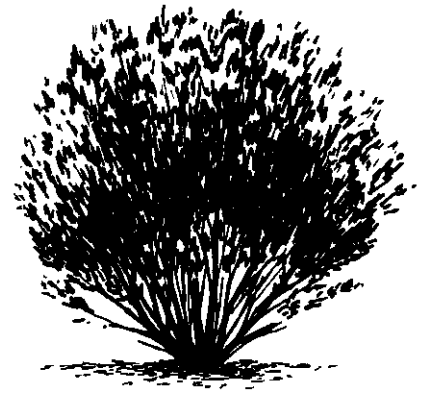
Look around your school for Eucalyptus trees.

Try to find out their names and when they flower.

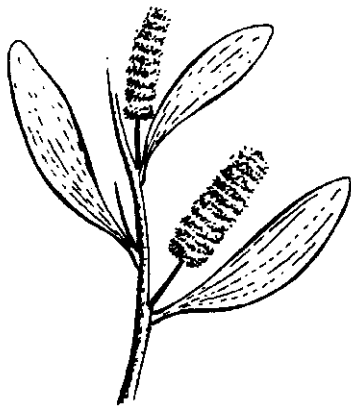
Make a collection of gum nuts.

2 The Acacia Family

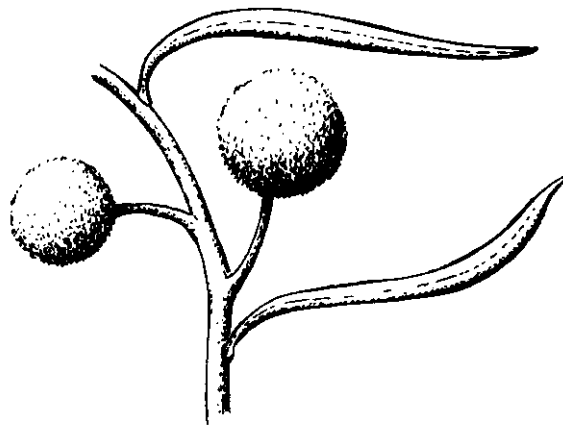
When Australian sportsmen and sportswomen travel overseas, they wear the colours of green and gold. These are the colours of Australia's floral emblem the Golden Wattle. It belongs to the Acacia (a-kay-sha) family and grows in South Eastern Australia. Its scientific name is *Acacia pycnantha*.



Members of this family are found all over Australia. All have yellow or gold flowers. The flowers are quite small. They grow in clusters called inflorescences.

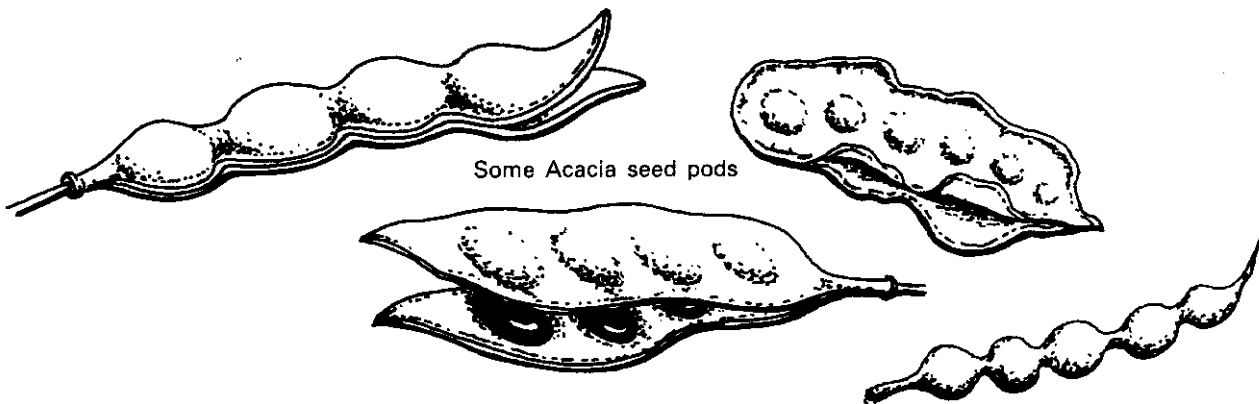


Some inflorescences are finger shaped



Others are round like a ball

The fruits of Acacias are not sweet and juicy. They are pods. The little seeds are inside the pods.



Some Acacia seed pods

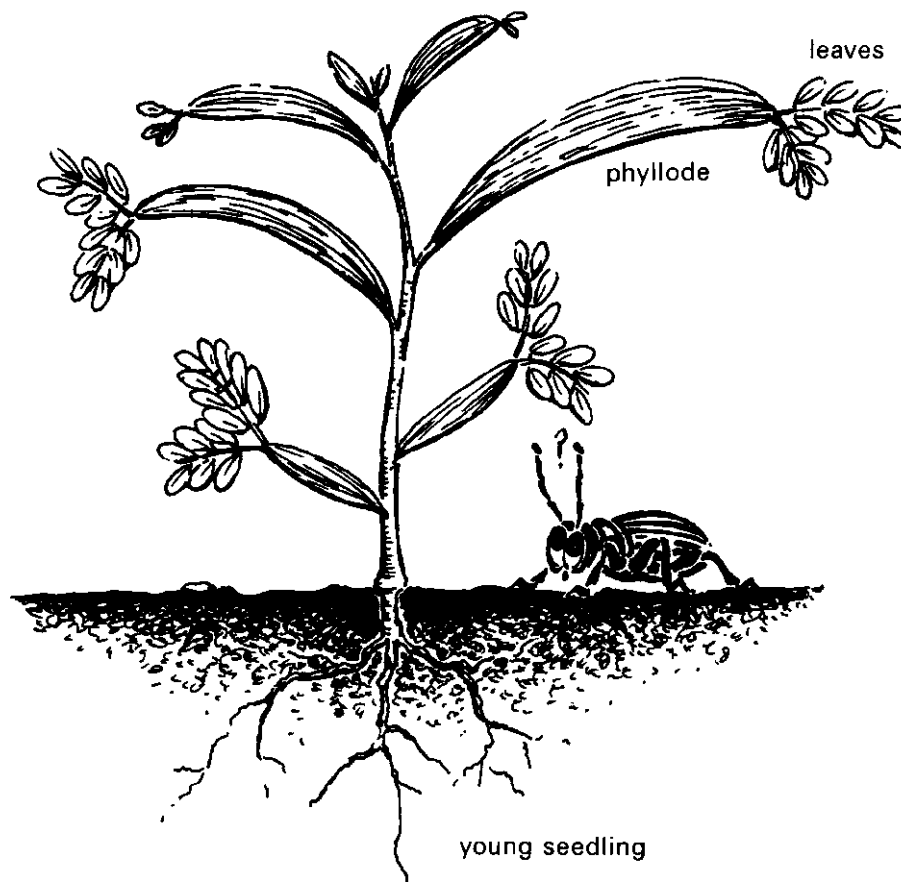
Some things to do.

Look around your school for Acacia shrubs.

Try to find out their names and when they flower.

If you can find some, study the flowers with a magnifying glass or binocular microscope.

Most plants have large leaves and small leaf stalks which attach them to the stem. Things are the other way around, however, on Acacias. They have very small leaves and large, flattened leaf stalks (called phyllodes). All the leaves drop off when the plants are still very young. The phyllodes make food for the plant by photosynthesis.



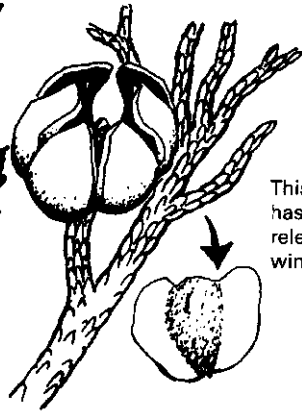
Check Point . . .

1. Eucalyptus flowers have
 - (a) large petals
 - (b) many pistils
 - (c) a cap
 - (d) sweet, juicy fruit
2. The large flattened leaf stalks on Acacias are called
3. Acacia fruits are
 - (a) sweet and juicy
 - (b) very similar to gum nuts
 - (c) usually flattened pods
 - (d) very tiny and shaped like round balls

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ACTIVITY 8 Do all plants have flowers?

Some plants don't have flowers. They have other ways of making their seeds.

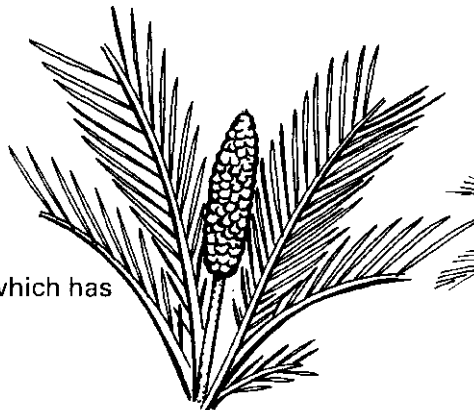


The cypress pine is found in many parts of Australia.

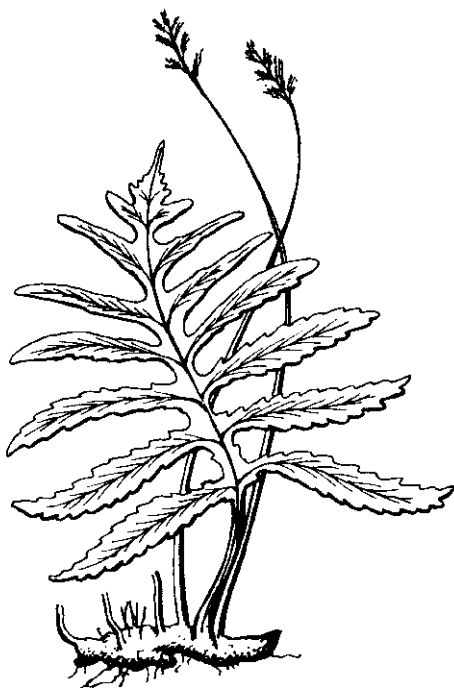
It makes its seeds inside cones instead of flowers.

This seed cone has opened releasing its winged seeds

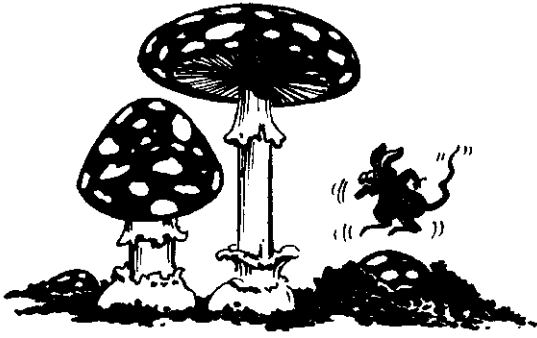
Cycads are another type of plant which has cones instead of flowers.



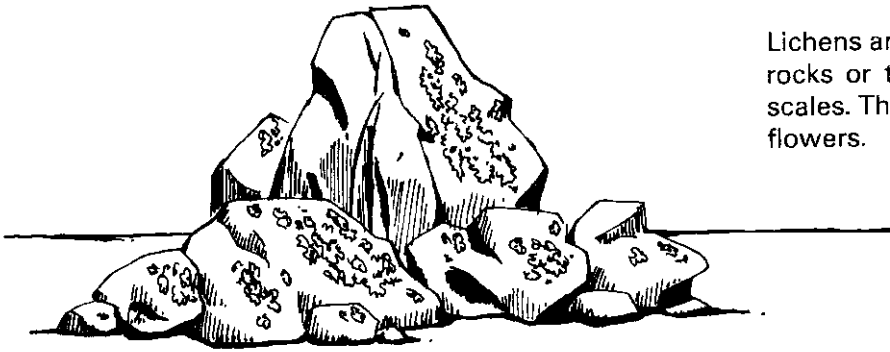
The pollen-bearing cone of a male Cycad



Ferns grow in shady damp areas. Their tiny seeds are called spores. These are made on the underside of the leaves.



Mushrooms are unusual plants which have no flowers and no leaves either. Their tiny seeds are called spores. They are made under the mushroom's cap.



Lichens are unusual, flat plants that grow on rocks or the bark of trees. They look like scales. They have no stems, no leaves and no flowers.



Seaweeds are another plant with no flowers. They make microscopic spores which float around in the water until they find a place to grow.

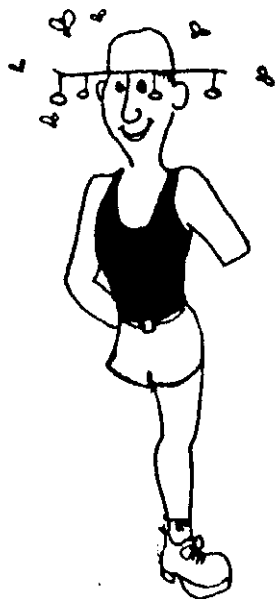
Check Point . . .

Classify these plants as *flowering* or *non-flowering*

1. River Red Gum
2. lichen
3. mushroom
4. wattle
5. apple tree
6. cycad

TEACHER'S
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ACTIVITY 9 New parts from old pieces



If you lost an arm or leg, you couldn't grow another one.
But plants can do this.



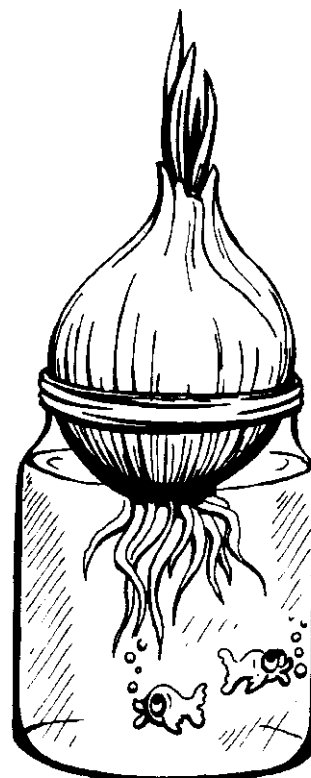
Many plants can grow from parts of old plants. Bananas are one plant that can do this. The following experiment will show you some others.

MATERIALS NEEDED

- jars and water
- onion
- carrot
- soil
- pins
- cotton thread
- knife

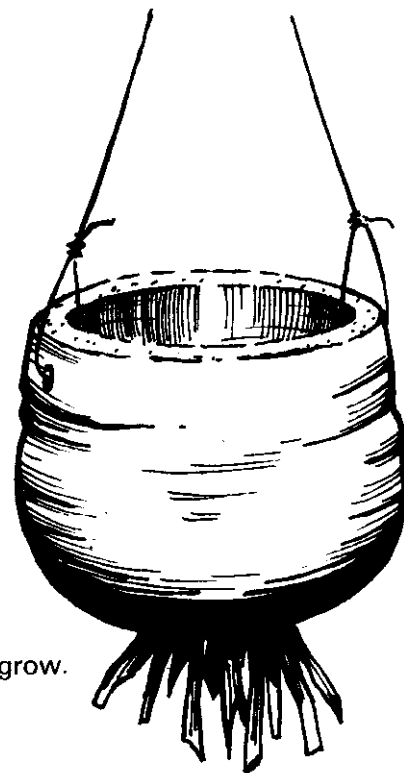
WHAT TO DO

- STEP 1** Try growing an onion in a jar of water.
New leaves start to grow from the top and new roots from the old base.



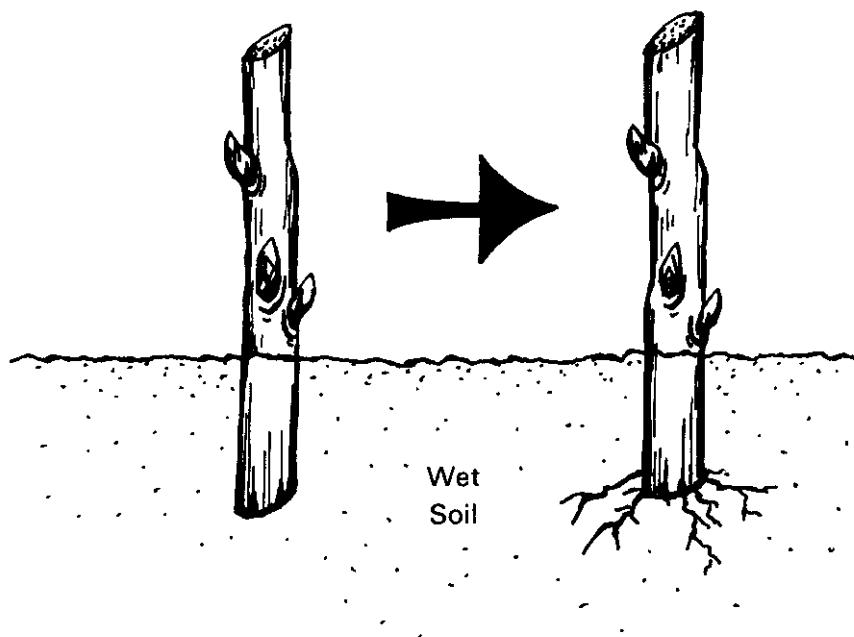
STEP 2 Get a carrot and cut it across near the top. Scoop out the centre of the piece which has the old leaves.

STEP 3 Hang it upside down in a sunny spot with pins and cotton thread.



STEP 4 Fill the hole in the centre with water and watch the carrot grow.

STEP 5 Try growing new plants from stem cuttings in soil or water.



Check Point . . .

Plants can reproduce themselves from seeds.

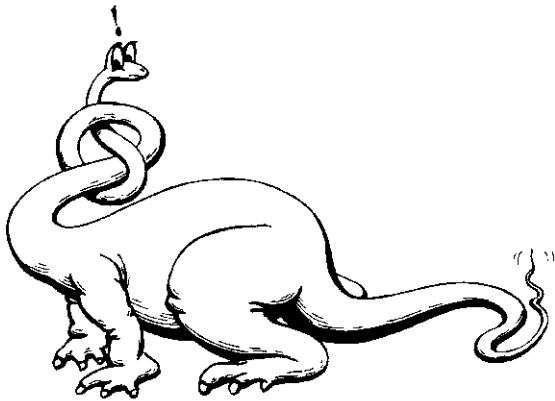
What is another way that plants can reproduce ?

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TEACHER'S
SIGNATURE

ACTIVITY 10 Dieback – Australia's Trees are in Danger



Giant animals called dinosaurs once lived on earth.
Suddenly they became extinct.
No one knows for sure why they disappeared.

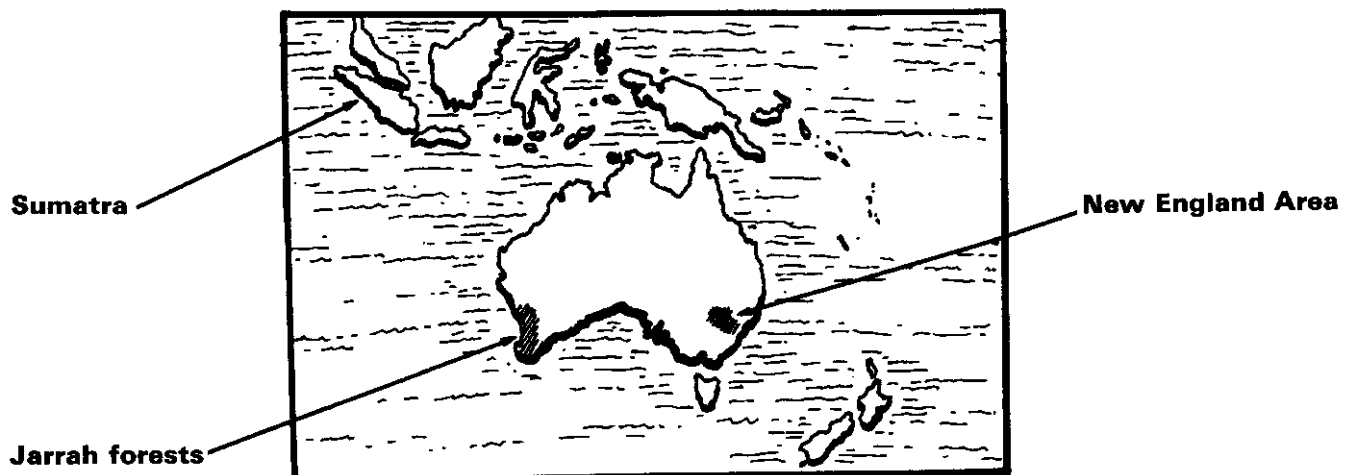
Today, another group of giants are in danger. Thousands of the earth's tall trees are dying.

The top branches die first. Later the trees become bare skeletons. Entire forests are dying. The problem is known as dieback. There are two main causes of dieback in Australia. Sadly, people are to blame in both cases.



1. Dieback of the Jarrah trees.

In Western Australia there are large forests of tall trees called Jarrah. They belong to the Eucalyptus family.



In the 1930's a large number of these Jarrah trees started dying. By the 1950's the damage was so serious the Australian scientists began research to find out the cause. In 1965, Dr. Frank Podger of the C.S.I.R.O. came up with the answer.

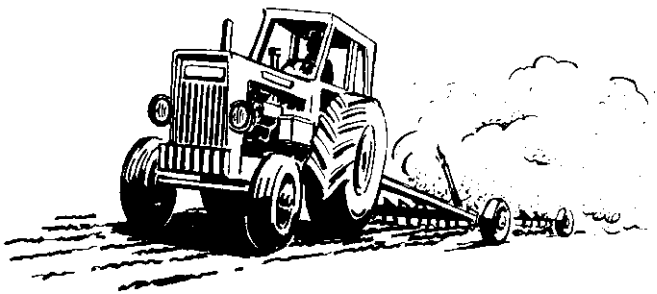
Dr. Podger found a fungus called *Phytophthora cinnamoni* was growing on the roots of the trees. This made it hard for the trees to absorb water and minerals from the soil. People had accidentally carried the fungus to Australia from Sumatra. It has also spread to Europe and North America. Scientists believe it is the most serious plant threat in history.

2. Dieback in the New England Area of N.S.W.

In the 1970's the trees of the New England area of New South Wales also started dying. At first scientists thought the fungus was killing them. It is now known to have a different cause.

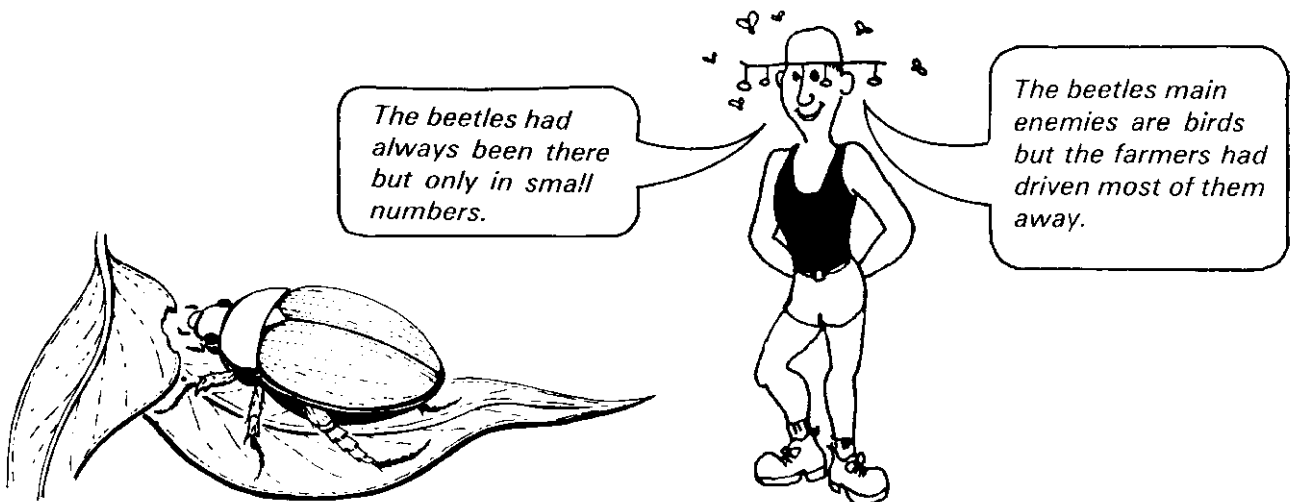


The New England area was once covered by forests. The trees were cleared for farming. This drove away many birds.



The farmers ploughed the soil and added fertilizers. This produced good pasture for cattle and sheep. However, it also produced more food for animals such as insects.

In the 1970's there was a population explosion of leaf eating beetles.



Big swarms of the beetles began eating the leaves of the remaining trees the farmers hadn't cleared. The beetles disappeared each winter but returned in summer in growing numbers. The trees weakened under the beetle attacks and started dying. A bad drought at the time made the trees even weaker and less able to stand up to the beetle attacks.

Scientists don't know how to solve the problem yet.
Some scientists are worried Australia's trees may disappear like the dinosaurs.



Check Point . . .

1. In what Australian state would you find Jarrah trees ?

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2. Why are they dying?

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3. Are people to blame for this? How?

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4. What is killing the trees of the New England area?

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5. Are people to blame for this? How?

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